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ABSTRACT

This report provides nationwide data on the salaries of members of the American Institute of Physics Member Societies for 1990. The report opens with a discussion of variations in doctorate salaries by geographic location. Data are presented for broad regions of the country, as well as for several states and individual cities. Compensation rates and salary structures in all major sectors of the economy that employ doctorate-level members are also described. The sectors include industry, government, national laboratories, and universities. Given that a large percentage of society members are academics, special attention is paid to how salaries vary throughout an academic career. In later sections, compensation patterns among master's and bachelor's degree holders are discussed, focusing primarily on variations by years of experience and employment sector. The final two sections of the report describe differences in doctorate salaries by primary work activity and sex. (GLR)

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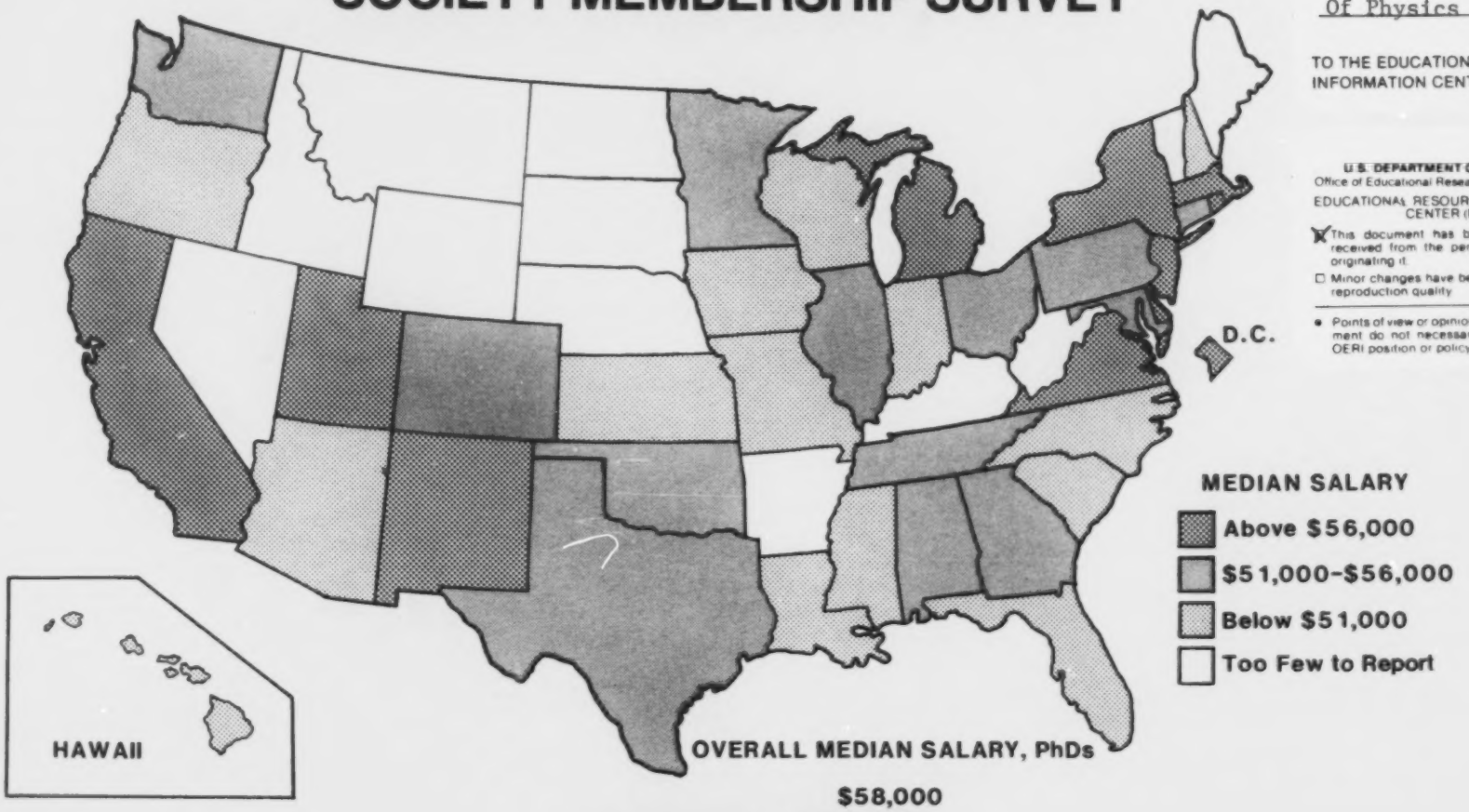
1990 SALARIES: SOCIETY MEMBERSHIP SURVEY



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1990 SALARIES:

SOCIETY MEMBERSHIP SURVEY

Dawn Kellman and Catherine Scholz

The American Physical Society
Optical Society of America
Acoustical Society of America
The Society of Rheology
American Association of Physics Teachers
American Crystallographic Association
American Astronomical Society
American Association of Physicists in Medicine
American Vacuum Society
American Geophysical Union

COVER (1)

This figure illustrates the variation in median salaries by state of residence. California and several states in the sunbelt and along the eastern coast maintain the greatest concentration of society members and the highest PhD salaries in the nation. Heavy representation of industry and national laboratories within these states, and the higher salaries associated with such employment, account for the salary distribution found within these areas. States where relatively low salaries are observed (the Plains and Southeastern states) generally have relatively few society members, most of whom are academically employed. Where shading is absent, there are too few society members to report reliable median salaries.

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INTRODUCTION

"1990 Salaries: Society Membership Survey" is the seventh in a series of salary reports produced by the Education and Employment Statistics Division of AIP. Initiated in 1982, the series provides nationwide data on the salaries of members of AIP's Member Societies. The 1990 report marks the first time that data based on all ten Member Societies, including the American Geophysical Union, are presented in aggregate. Some highlights of the report include:

- The median annual salary for society members overall reached $54,000 in 1990.
- Among PhDs, salaries continue to keep pace with inflation. The median salary reported by PhDs rose from $55,000 in 1989 to $58,000 in 1990. This represents a 5.5% annual increase, matching the 5.3% inflation rate as measured by the Consumer Price Index.
- Typical starting salaries among recent doctorate recipients range from $35,500 to $50,600 per year, depending on employment sector.
- Across all degree levels, the industrially-employed continue to command the highest wages.
- Over one-third of all PhDs supplement their principal salary with professional income from additional sources. This includes income derived from consulting, summer research, teaching, and, to a lesser extent, patents, royalties, and honoraria.
- PhDs in the Pacific states report the highest overall median salary, $61,300. Those in the West North Central report the lowest, $48,000.
- The proportion of women in the ten AIP Member Societies has increased during the 1980s. Among society members, women now represent 7% of all PhDs, 14% of all masters, and 17% of all bachelors. The entrance of the American Geophysical Union in 1987 accounts for some, but not all, of this increase.
- Female society members earn lower overall salaries than males. Gender differences in age, degree distribution, and academic rank do not entirely account for this wage gap.

Methodology

The figures presented here are based on a stratified random sample of one-sixth of the U.S. membership of the AIP Member Societies. The three smallest societies, the American Association of Physicists in Medicine, the American Crystallographic Association, and the Society of Rheology, were sampled at a higher rate so that each of the ten Member Societies would be well represented. Individuals eligible for inclusion in the 1990 sample had memberships that were current as of December 1989.

In the spring of 1990, all sample members were mailed a brief, two-page questionnaire. The form contained various demographic and employment-related questions regarding subjects such as work activity, level of highest degree, salary and employer. A postage-paid return envelope was also provided. Several weeks after the initial mailing, a second wave of questionnaires was mailed to those who had not yet returned a completed form. Of the 14,899 members who were mailed a questionnaire, 106 forms were returned as undeliverable and 90 members either were deceased, had moved abroad, or refused to participate. Roughly 9,780 completed forms were received, resulting in a 67% response rate.

Structure of the Report

The report opens with a discussion of variations in PhD salaries by geographic location. Data are presented for broad regions of the country, as well as for several states and individual cities. Compensation rates and salary structures in all major sectors of the economy that employ PhD-level members are then described. The sectors include industry, government, national laboratories, and universities. Given that a large percentage of society members are academics, special attention is paid to how salaries vary throughout an academic career. In later sections, compensation patterns among master's and bachelor's degree holders are discussed, focusing primarily on variations by years of experience and employment sector. The final two sections of the report describe differences in PhD salaries by primary work activity and sex. Readers seeking more in-depth information are encouraged to contact the authors.

Caveats

In 1986, the American Geophysical Union (AGU) became the tenth AIP Member Society. Separate analyses of AGU members' salaries were first presented in the 1987 salary report, then again in 1989. Because the current report presents salaries for all ten Member Societies in aggregate for the first time, the data that are presented here cannot be directly compared with earlier published figures.

One final note: salary tables discussing lower-degree holders must be interpreted with caution. Lower-degree holders are poorly represented in the society membership and those who are members tend to be atypical, with special interests in specific society programs.

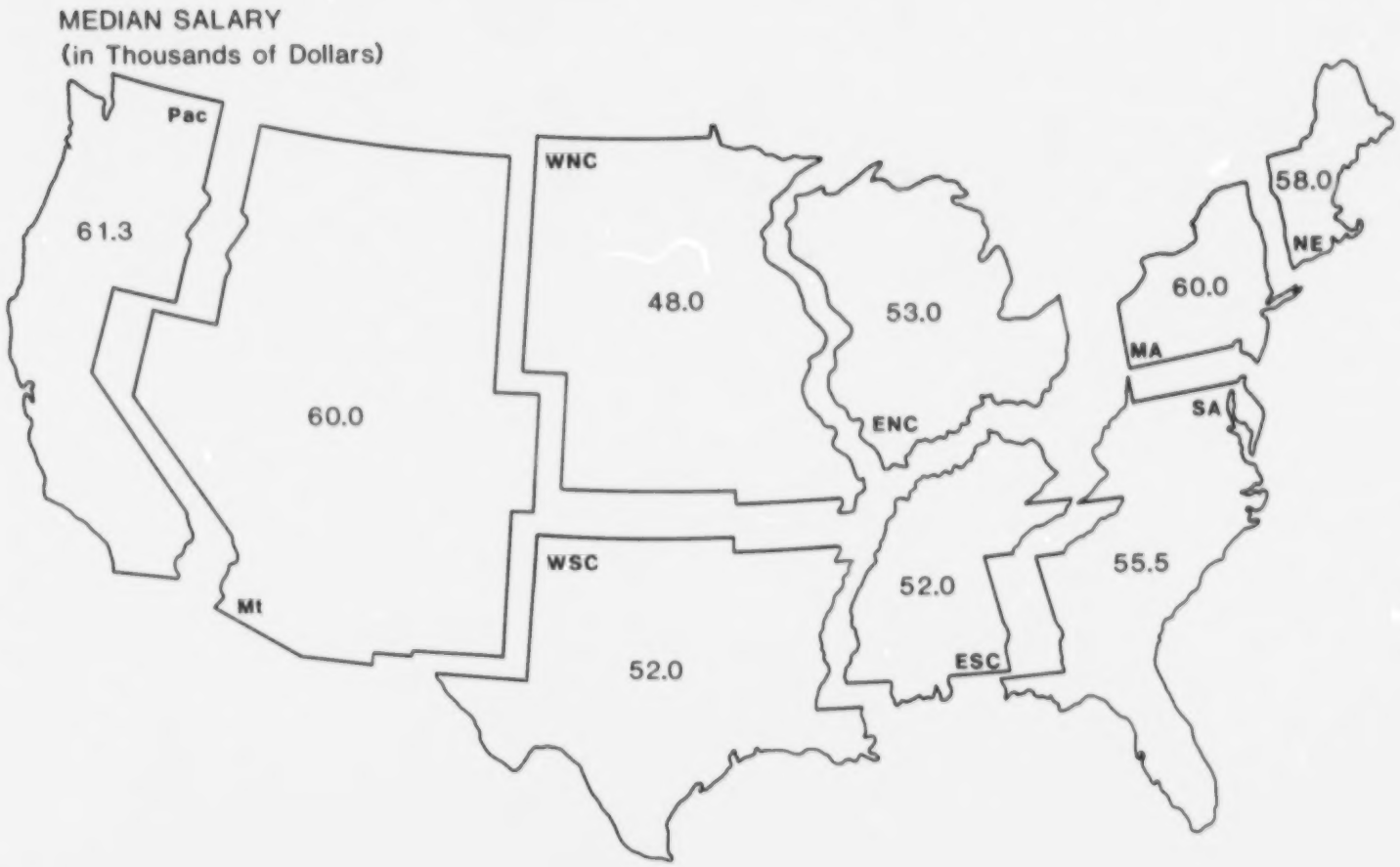

Figure 1. Variation in median salary for PhDs by geographic division, 1990.

Table 1. 1990 salaries by geographic division, PhDs.[a]

	Median Salary	Mean Salary (in thousands of dollars)	Standard Deviation	Median Age	Total Number Known
New England	58.0	61.3	43.1	44	453
Middle Atlantic	60.0	62.8	28.1	45	828
South Atlantic	55.5	58.2	20.8	46	914
East North Central	53.0	55.6	20.8	46	593
East South Central	52.0	52.7	19.1	47	150
West North Central	48.0	51.4	19.5	46	200
West South Central	52.0	55.2	22.1	43	285
Mountain	60.0	59.5	19.6	45	488
Pacific	61.3	65.2	26.4	44	1112

[a] *See Appendix A for state composition of each division.*

SALARIES AND GEOGRAPHIC LOCATION FOR PhDs

• Median salaries for society members holding doctorates vary substantially with geographic location, ranging from $48,000 in the West North Central states to $61,300 in the Pacific. Such differences are due primarily to the salary structures of the individual employment sectors, combined with the employer and age composition of each division. The distribution of states in each division can be found in Appendix A.

• In all geographic divisions of the country, society members employed in industry and other nonacademic sectors receive higher median salaries than those who work in academe. Typically, the highest levels of compensation are observed in industry, although in some states, median salaries in other nonacademic sectors are also quite high due to the influence of large, well-paying national laboratories.

• Although they are among the youngest society members overall, those employed in the Pacific division earn the highest median salary nationwide, $61,300. This figure can be attributed primarily to the high degree of nonacademic private sector employment in California, where nearly 90% of the Pacific division's society members reside. Here, industry accounts for 40% of all employment. In the other Pacific states, academic employment is more prevalent and median salaries are somewhat lower.

Table 2. 1990 salaries by selected employment sector and geographic division, PhDs.

	Academe			Industry			Other		
	Median Salary	Median Age	%	Median Salary	Median Age	%	Median Salary	Median Age	%
New England	49.0	43	52	70.0	44	27	61.3	44	21
Middle Atlantic	53.0	48	49	67.3	41	37	60.0	47	14
South Atlantic	47.0	47	38	65.0	46	20	60.0	47	42
East North Central	50.0	47	65	62.0	44	18	55.0	44	17
East South Central	42.0	47	61	*	*	6	58.7	48	33
West North Central	43.3	48	69	60.0	38	22	*	*	9
West South Central	44.0	44	56	62.0	41	32	55.4	47	12
Mountain	44.3	46	32	63.0	47	14	65.0	45	54
Pacific	50.0	43	37	70.0	44	37	61.0	43	26
Overall	48.2	46	46	66.1	44	27	60.6	45	27

**Number of respondents was too small to calculate reliable medians.*

• The median salary in the Mountain states, $60,000, is second only to that in the Pacific division. This high overall figure can be attributed primarily to the large, well-paying national laboratories in New Mexico, Arizona, and Colorado, such as Sandia and Los Alamos. Over 40% of society members residing in the Mountain states are employed at national laboratories, where they report earning a median salary above that of even their industrial counterparts. In New Mexico, over three-quarters of society members are employed at national labs.

• Nearly 40% of society members residing in the Middle Atlantic division are employed in industry. This heavy concentration of industrial employment, combined with fairly high industrial salaries, is largely responsible for the overall median salary of $60,000 observed in the division. The median age of industrially-employed individuals in these states, furthermore, is three years below the national median, making their salaries, when controlled for age, the highest industrial salaries in the country. Academic salaries in the Middle Atlantic are also high relative to the rest of the U.S.

• Relatively low median salaries, $52,000 or less, are reported in the East South Central, West South Central, and West North Central divisions. A very high proportion of society members in these states is employed in academe, mostly at state universities or small private colleges. Some of the lowest-paid industrial employees in the country also reside in these three divisions. However, the relatively inexpensive cost of living in these states brings their salaries more in line with rates of compensation in other parts of the country.

Table 3. 1990 salaries and employment sector distribution for selected states, PhDs.[a]

	Median Salary	Mean Salary	Standard Deviation	Median Age	Total Number Known	Academe %	Industry %	Gov't %	FFR&DC %	Other %
	(in thousands of dollars)									
Alabama	55.0	57.3	23.1	47	34	72	13	13	–	2
Arizona	50.3	54.5	22.0	43	60	61	11	6	15	7
California	65.0	67.3	27.2	44	941	32	40	6	18	4
Northern	65.0	67.8	26.6	44	484	25	37	9	24	5
Southern	63.0	66.8	27.8	43	457	40	42	3	12	3
Colorado	51.1	54.9	19.2	44	135	35	26	28	9	2
Connecticut	55.0	65.3	93.5	45	73	60	28	4	–	8
Delaware	61.0	67.3	25.6	45	26	21	71	–	4	4
DC	63.0	61.5	17.2	48	156	10	2	80	1	7
Florida	47.8	51.0	18.8	46	106	64	15	14	–	7
Georgia	54.0	56.9	23.4	46	55	65	17	4	–	14
Hawaii	45.0	50.9	19.0	40	22	71	4	7	–	18
Illinois	51.7	55.1	21.1	45	198	53	14	2	25	6
Indiana	46.0	51.9	22.0	45	76	90	6	3	–	1
Iowa	47.0	51.6	19.7	45	41	82	4	–	12	2
Kansas	42.0	50.9	23.5	51	22	80	13	–	5	2
Louisiana	50.0	51.5	20.7	46	28	82	15	–	–	3
Maryland	55.0	57.6	18.1	45	262	26	21	42	4	7
Massachusetts	60.4	63.1	23.5	44	299	44	29	11	7	9
Michigan	57.0	58.7	20.4	44	109	65	25	4	–	6
Minnesota	52.0	54.0	19.4	44	70	58	36	–	–	6
Mississippi	40.5	44.9	14.2	43	22	56	–	44	–	–
Missouri	50.0	51.1	16.5	46	46	66	26	–	–	8
New Hampshire	48.2	48.5	16.9	41	33	72	21	6	–	1
New Jersey	66.0	68.4	20.5	44	217	27	61	2	7	3
New Mexico	65.0	66.2	18.2	46	219	10	7	4	77	2
New York	59.8	62.8	33.4	46	423	51	31	2	9	7
Northern	56.1	58.4	19.2	45	207	59	35	1	2	3
Southern	62.9	67.0	42.4	47	216	43	27	2	17	11
North Carolina	49.3	52.2	18.8	47	75	75	18	3	–	4
Ohio	55.0	58.0	20.1	48	138	61	24	11	–	4
Oklahoma	52.7	55.4	24.0	47	31	45	38	15	–	2
Oregon	43.0	48.2	17.6	45	42	81	17	–	–	2
Pennsylvania	52.5	56.2	19.9	47	187	71	22	2	–	5
Rhode Island	59.0	57.3	25.8	44	21	82	14	4	–	–
South Carolina	40.0	48.8	19.9	43	25	78	16	–	4	2
Tennessee	56.0	54.6	18.1	47	74	48	5	–	45	2
Texas	54.0	55.9	22.1	43	216	53	35	5	–	7
Utah	59.0	54.5	17.9	50	32	87	10	3	–	–
Virginia	60.0	63.7	24.5	47	200	36	32	24	5	3
Washington	53.0	55.0	16.9	44	92	48	31	6	12	3
Wisconsin	46.6	51.2	19.4	44	72	80	17	2	–	1

[a] Several states were not included above because the number of respondents was too small to calculate reliable statistics.

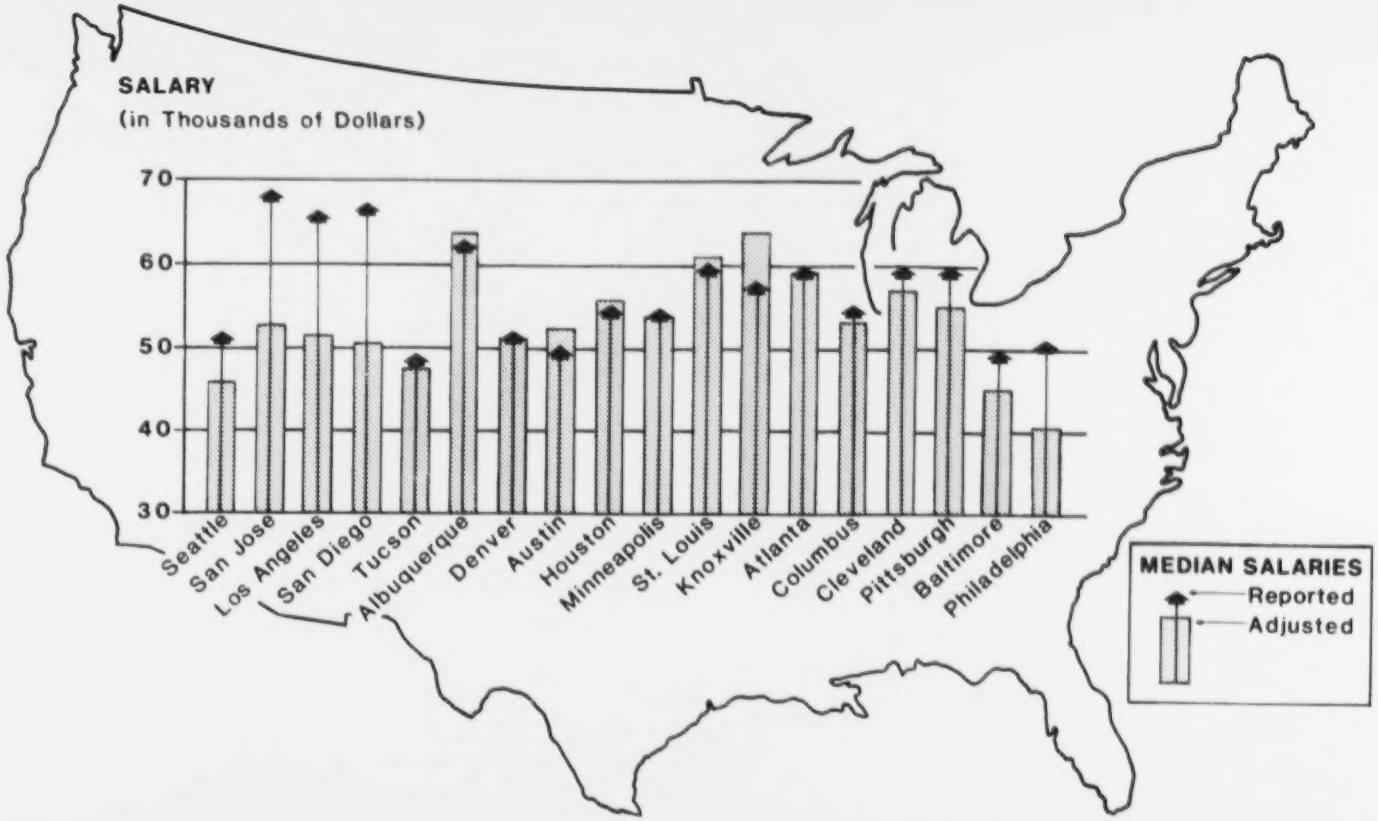

Figure 2. Median salaries for PhDs in selected metropolitan areas, 1990. Both reported salaries and salaries adjusted for cost of living are presented.

• The cities listed in Table 4 all volunteered to participate in a survey conducted by the American Chamber of Commerce Researchers Association (ACCRA) during the first quarter of 1990. Each of these cities has a substantial number of society members in residence, permitting calculation of reliable medians. Several large metropolitan areas, including New York, Boston, San Francisco, and Washington, D.C., did not respond to the ACCRA survey and are consequently absent from the table.

• In an attempt to "provide a useful and reasonably accurate measure of living cost differences among urban areas," each respondent to the ACCRA survey is assigned a cost-of-living index based upon relative price levels for a standardized basket of goods and services. The national average for the index is 100; areas with indices above this figure have a relatively high cost of living, while those with indices below have a relatively low one. The adjusted salaries in Table 4 reflect relative rates of compensation after the cost of living is taken into account and cannot be considered representative of absolute buying power.

• In San Jose, Los Angeles, San Diego, and Philadelphia, the cost of living, especially housing and health care, is so high that society members'

Table 4. 1990 median salaries adjusted for cost of living in selected metropolitan areas, PhDs.[a]

	Cost of Living Index	Median Salary	Adjusted Salary	Median Age	Academic %	Non-Academic %	Total Number Known
Albuquerque	99.1	62.8	63.4	44	14	86	82
Atlanta	101.8	60.0	58.9	44	61	39	38
Austin	95.4	50.0	52.4	43	85	15	40
Baltimore	111.4	50.0	44.9	44	43	57	67
Cleveland	106.2	60.0	56.5	46	44	56	31
Columbus	104.0	55.0	52.9	49	76	24	35
Denver	101.3	52.0	51.3	46	23	77	48
Houston	99.5	55.4	55.7	42	35	65	70
Knoxville	90.9	57.7	63.5	49	21	79	44
Los Angeles	127.4	66.0	51.8	44	40	60	129
Minneapolis	102.9	55.0	53.4	44	62	38	41
Philadelphia	127.5	51.5	40.4	43	66	34	68
Pittsburgh	109.5	60.0	54.8	48	61	39	33
St. Louis	98.2	60.0	61.1	44	45	55	24
San Diego	132.8	67.0	50.5	43	36	64	109
San Jose	129.3	68.0	52.6	43	25	75	78
Seattle	113.2	52.0	45.9	45	66	34	55
Tucson	102.9	49.0	47.6	41	64	36	42

[a] *Cost of Living Index from the American Chamber of Commerce Researchers Association, national average = 100.0.*

$$\text{Adjusted salary} = \frac{\text{Median Salary}}{\text{cost of living \%}}$$

adjusted salaries fall more than 20% below their reported salaries. The impact of such high living expenses is mitigated somewhat in the three California cities by high unadjusted median salaries of more than $65,000, primarily from industrial employers. Even after the cost of living is taken into account, members in these cities receive adjusted salaries which exceed $50,000. In Philadelphia, however, two-thirds of society members are employed in academe and an already low unadjusted salary of $51,500 drops to $40,400 when the high cost of living in the city is considered.

• The adjusted median salary in Baltimore is $44,900, the second lowest among the metropolitan areas listed in Table 4. As in Philadelphia, this figure is due to a combination of high living costs and a low unadjusted median salary of $50,000. Approximately 45% of society members in the area are employed in academe, and an additional 15% are working in government, where salaries are also typically below the national median.

• Among the urban areas listed in Table 4, Albuquerque and Knoxville have the highest median salaries after adjustments are made for local cost of living. Over three-fourths of society members in these cities are employed in high-paying nonacademic jobs, primarily at Sandia and Oak Ridge National Laboratories. This heavy concentration of nonacademic employment, combined with a fairly low cost of living, is reflected in adjusted salaries which are exceptionally high.

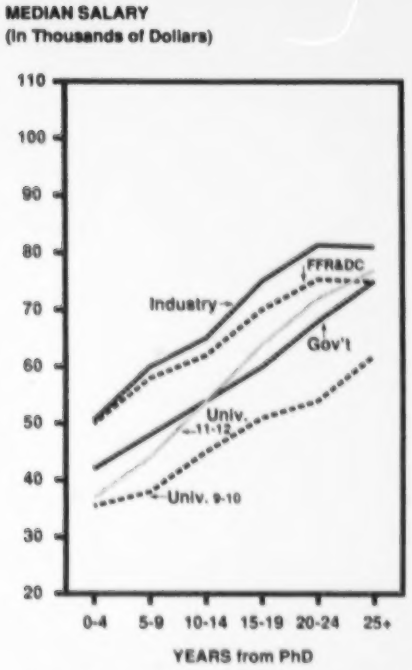

Figure 3. Median salaries by type of employer and years from PhD, 1990.

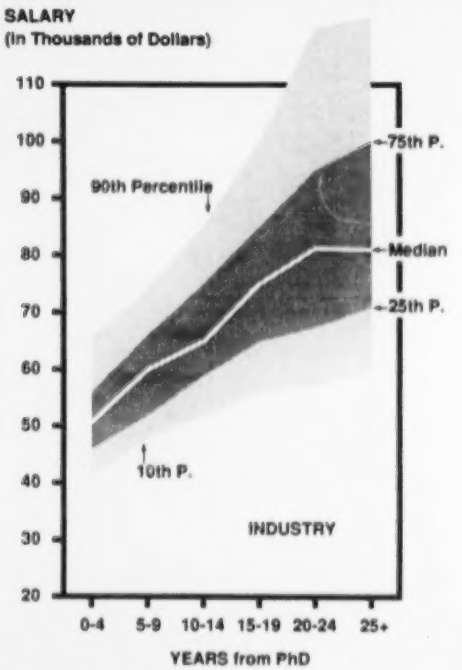

Figure 4. Salary structure in industry by years from PhD, 1990.

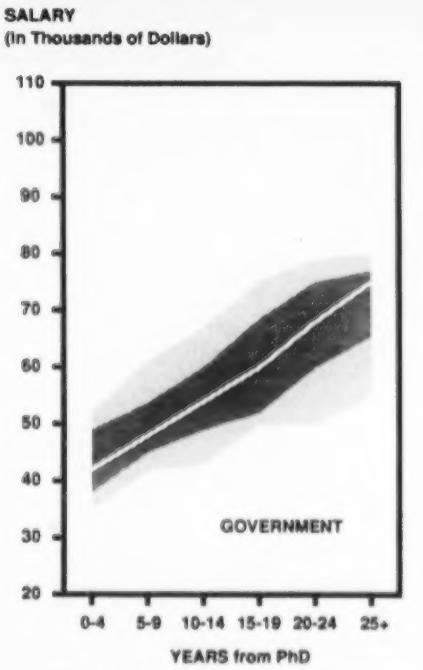

Figure 5. Salary structure in government by years from PhD, 1990.

SALARIES AND EMPLOYMENT SECTOR FOR PhDS

- PhDs report earning a median annual salary of $58,000 in 1990. However, rates of compensation vary considerably from one employment sector to the next. Typical salaries range from a low of $40,000 in four-year colleges up to $66,100 in industry.
- Between March 1989 and March 1990, the inflation rate, as measured by the Consumer Price Index, was 5.3%. On the whole, PhD salaries managed to keep pace with inflation, rising 5.5% during the same twelve-month period. However, this varied from sector to sector. Only university and industrial salaries experienced increases near the inflation rate. Salaries in government, national laboratories and nonprofit organizations lost ground to inflation.
- A new entrant into the labor market earns, on average, anywhere from $35,500 to $50,600, depending on employment sector. Salaries then increase steadily with experience, and differences between the various sectors become even more pronounced.
- As in all employment sectors, industrial salaries are clustered in a fairly narrow range during the early career years. After fifteen years of experience, though, the spread of typical salaries in industry becomes very wide. This is due to a number of high-wage earners, primarily administrators, who pull the top end of the salary distribution up past the $100,000 a year mark.
- In government, unlike industry, significant discrepancies do not exist between the highest and lowest salaries. This is a reflection of the structure of the civil service grades and of federal salary ceilings. In addition to falling into a narrow range, government salaries are also the lowest among all nonacademic employers. At most levels of experience, salary increases of 20–25% would be necessary to make government competitive with the private sector.

Table 5. 1990 salaries by major employment sector, PhDs.

	Median Salary	Mean Salary	Standard Deviation	Median Age	Total Number Known
	(in thousands of dollars)				
University					
9–10 Month Salary	50.0	53.3	17.2	48	1176
11–12 Month Salary	49.2	53.9	25.8	41	848
4-Year Colleges					
9–10 Month Salary	40.0	41.4	10.0	49	170
Industry/Self-Employed	66.1	71.9	35.0	44	1333
Government	57.0	57.7	14.4	47	533
FFR&DC	64.5	64.8	17.2	44	565
Nonprofit	60.0	61.2	24.9	45	155
Hospital	63.0	65.5	32.8	44	76

Table 6. 1990 salaries by years from degree, PhDs.

Years from Degree	Median Salary	Mean Salary	Standard Deviation	Median Age	Total Number Known
	(in thousands of dollars)				
0–4	43.8	44.7	12.3	33	501
5–9	50.8	51.4	14.2	36	791
10–14	57.0	58.1	16.9	41	758
15–19	65.0	65.8	21.4	46	811
20–24	67.0	69.5	35.5	50	770
25–29	70.0	70.0	22.3	55	522
30 +	72.0	76.3	33.9	62	527

[a] Postdoctorates excluded.

Table 7. 1990 industrial salary structure by years from degree, PhDs.[a]

Years from Degree	PERCENTILE SALARIES 10th	25th	Median	75th	90th	Mean Salary	Standard Deviation	Median Age	Total Number Known
			(in thousands of dollars)						
0–4	41.0	46.0	50.6	56.0	65.7	52.1	11.3	33	173
5–9	48.0	52.0	60.0	66.0	74.0	60.0	13.7	37	264
10–14	51.8	59.0	65.0	75.0	85.2	67.9	15.8	41	251
15–19	56.1	65.0	75.0	85.0	100.0	77.9	25.3	46	254
20–24	57.0	67.5	81.3	95.0	120.0	86.6	60.4	50	185
25 +	60.0	71.0	81.0	100.0	122.0	93.1	47.5	59	182

[a] In addition, there were 17 postdoctorates in the 0–4 years from degree group with a median salary of $46,000.

Table 8. 1990 government salary structure by years from degree, PhDs.[a]

Years from Degree	PERCENTILE SALARIES 10th	25th	Median	75th	90th	Mean Salary	Standard Deviation	Median Age	Total Number Known
			(in thousands of dollars)						
0–4	35.0	38.0	42.0	49.0	52.0	43.7	8.7	33	43
5–9	41.8	45.0	48.0	53.7	61.0	49.6	9.1	38	78
10–14	43.0	49.0	54.0	60.0	67.0	54.0	9.2	42	84
15–19	50.0	52.0	60.0	68.5	75.0	60.8	9.8	47	101
20–24	50.0	60.0	68.0	75.0	79.0	66.5	11.0	51	97
25 +	55.0	65.4	75.0	77.0	80.0	70.8	10.8	59	94

[a] In addition, there were 28 postdoctorates in the 0–4 years from degree group with a median salary of $31,200.

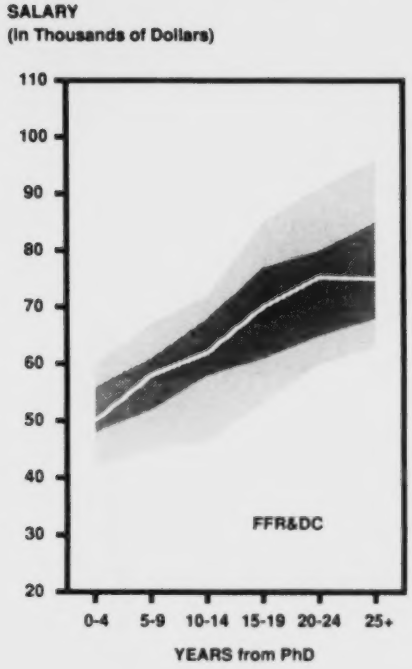

Figure 6. Salary structure in the national laboratories by years from PhD, 1990.

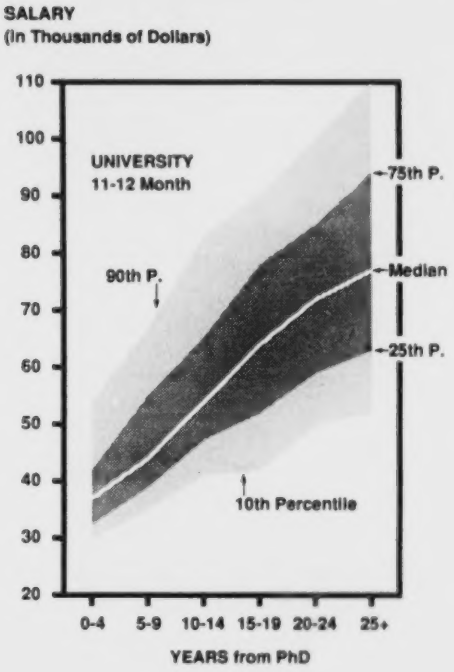

Figure 7. Salary structure in universities for 11–12 month salary base, by years from PhD, 1990.

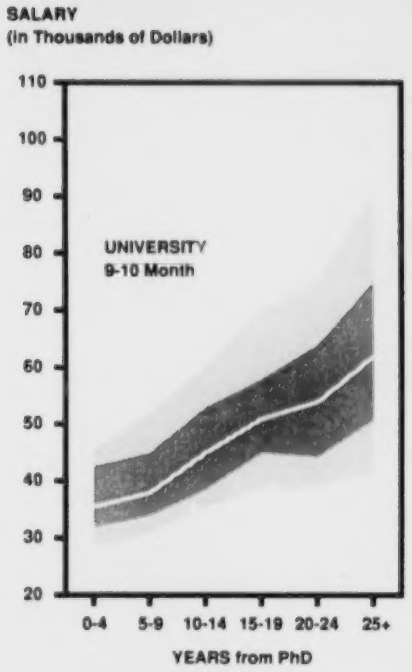

Figure 8. Salary structure in universities for 9–10 month salary base, by years from PhD, 1990.

• PhDs employed at the national laboratories are among the youngest and best-paid of all society members. The average salary paid to members at national labs, $64,500, is second only to that in industry. Half of all society members with doctorates who work at a national laboratory are employed at one of three installations: Los Alamos National Laboratory, Lawrence Livermore National Laboratory, and Sandia National Laboratory.

• Salary ranges for members working on a 9–10 month salary base in universities are relatively narrow at each level of experience. These individuals are almost exclusively full, associate, and assistant professors who are engaged primarily in teaching and secondarily in basic research. Many supplement their salary with income derived from summer research, consulting, and summer course loads; roughly 80% of all PhDs on 9–10 month contracts report earning some form of additional professional income, which amounts to 18%, on average, of their total income.

• University employees on 11–12 month contracts receive salaries which are clustered within a narrow range during the first several years from degree. Later, the span of typical salaries broadens considerably, such that the scattering of salaries becomes as great as that observed in industry. This is a reflection of the diverse career paths observed in academe–paths ranging from professorships to administrative and research staff positions.

Table 9. 1990 FFR&DC salary structure by years from degree, PhDs.[a]

Years from Degree	PERCENTILE SALARIES 10th	25th	Median (in thousands of dollars)	75th	90th	Mean Salary	Standard Deviation	Median Age	Total Number Known
0–4	42.0	48.0	50.0	56.0	60.0	52.5	10.5	32	43
5–9	45.0	52.0	58.0	61.0	67.0	56.9	7.8	35	92
10–14	46.4	58.0	62.0	68.0	72.0	61.6	9.9	41	91
15–19	53.4	61.0	70.0	77.1	85.0	70.4	12.8	46	104
20–24	60.0	65.0	75.3	80.0	91.0	75.8	13.7	50	92
25 +	62.9	68.0	75.0	85.0	96.0	78.5	15.9	59	96

[a] *In addition, there were 36 postdoctorates in the 0–4 years from degree group with a median salary of $32,000.*

Table 10. 1990 university 11–12 month salary structure by years from degree, PhDs.[a]

Years from Degree	PERCENTILE SALARIES 10th	25th	Median (in thousands of dollars)	75th	90th	Mean Salary	Standard Deviation	Median Age	Total Number Known
0–4	30.0	32.4	37.0	42.0	54.0	39.0	9.7	33	78
5–9	35.0	39.0	44.0	55.0	66.8	48.7	14.2	36	108
10–14	41.1	47.3	54.0	65.3	83.0	58.1	16.1	41	89
15–19	42.0	52.0	64.0	78.0	90.0	65.2	19.9	46	93
20–24	50.0	59.0	72.0	85.0	100.0	73.9	21.3	50	106
25 +	52.0	63.0	77.0	94.0	110.0	80.3	26.4	59	141

[a] *In addition, there were 172 postdoctorates in the 0–4 years from degree group with known salaries working in universities on an 11–12 month salary base. Their median salary was $27,000.*

Table 11. 1990 university 9–10 month salary structure by years from degree, PhDs.[a]

Years from Degree	PERCENTILE SALARIES 10th	25th	Median (in thousands of dollars)	75th	90th	Mean Salary	Standard Deviation	Median Age	Total Number Known
0–4	28.0	31.9	35.5	42.6	45.3	36.8	7.1	33	98
5–9	31.0	34.0	38.0	45.0	52.0	40.3	8.4	36	164
10–14	35.5	38.6	45.0	53.0	60.0	46.3	10.4	40	156
15–19	38.8	45.0	51.0	58.0	70.0	52.7	13.0	45	143
20–24	39.0	44.3	54.0	64.0	75.0	55.7	14.4	50	194
25 +	41.6	50.8	62.0	75.0	91.0	64.2	18.0	58	418

[a] *Number of postdoctorates was too small to calculate reliable medians.*

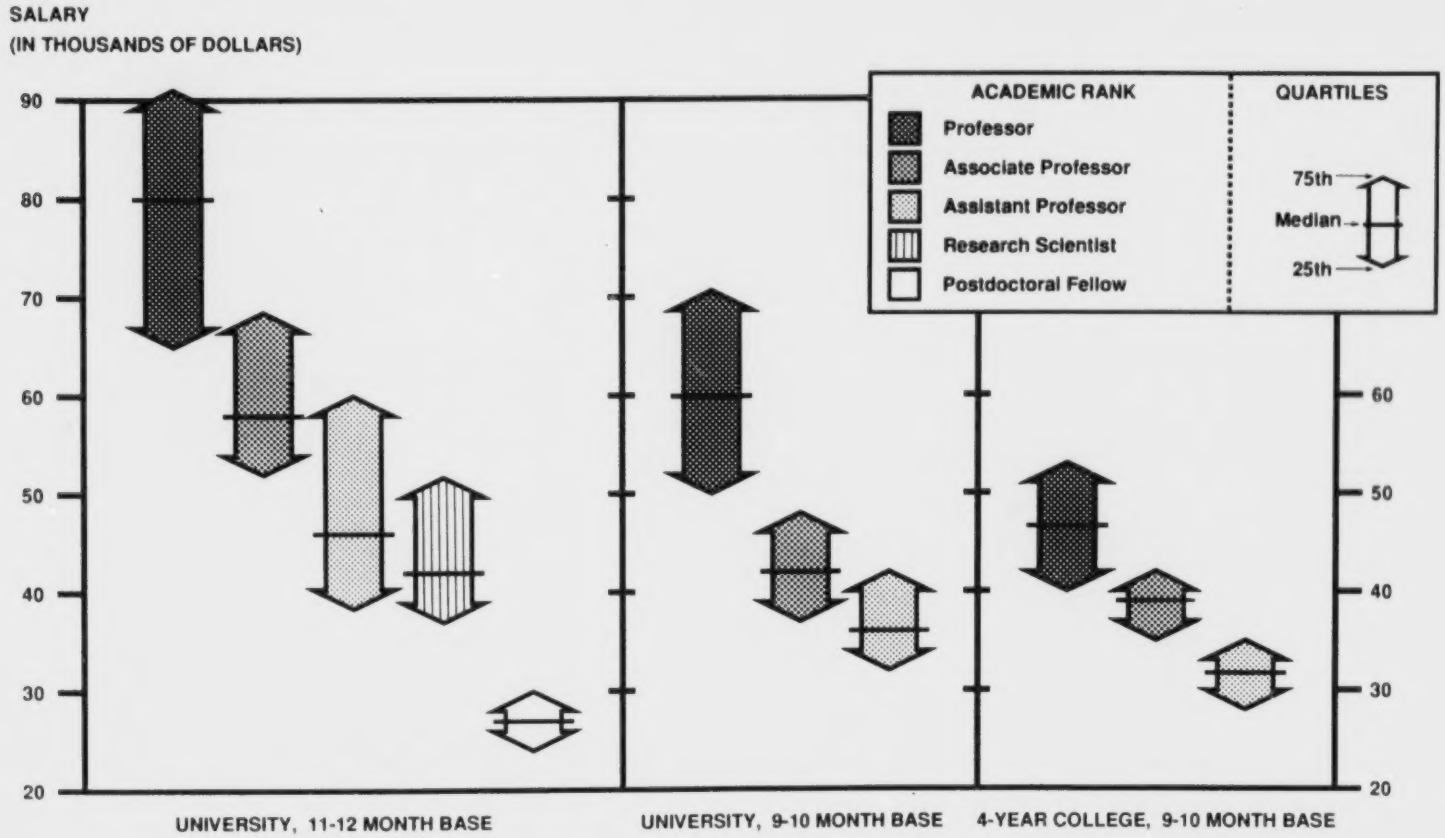

Figure 9. University and 4-year college salaries for PhDs by academic rank, 1990.

Salaries and Academic Rank

• The university is the single largest employer of society members; roughly 40% of all members with doctorates work in a university. As a group, the academically-employed tend to be older and less well paid than their nonacademic colleagues.

• Academic salaries vary by rank, discipline, and type of institution. Based on responses from more than 2,100 colleges and universities, the American Association of University Professors (AAUP) reports that faculty members at private, independent institutions earn the highest salaries, followed by faculty at public institutions. Private, church-related institutions pay the least. Similarly, salaries reflect the types of degrees an institution awards. Doctoral-granting facilities are the best paying, followed by comprehensive, baccalaureate, and two-year institutions.

• The aging of the university professoriate continues to be a major concern for the physics community. Six out of ten society members who hold

Table 12. 1990 university salaries by selected academic rank and salary base, PhDs.

	QUARTILE SALARIES (in thousands of dollars)			Mean Salary	Standard Deviation	Median Age	Total Number Known
	25th	Median	75th				
Professor							
9–10 Month Salary	50.0	59.5	70.6	61.9	16.2	53	709
11–12 Month Salary	65.0	80.0	91.0	79.9	21.2	53	237
Associate Professor							
9–10 Month Salary	37.0	42.0	48.0	43.1	7.7	41	262
11–12 Month Salary	52.0	58.0	68.5	61.2	14.8	44	84
Assistant Professor							
9–10 Month Salary	32.0	36.0	42.0	36.9	6.8	34	194
11–12 Month Salary	38.4	46.0	60.0	49.7	15.3	36	70
Research Associate (11–12 Month Salary)							
Postdoctorates	24.0	27.0	30.0	27.0	4.2	32	194
Other Research Staff	37.0	42.0	51.7	46.0	12.7	39	174

Table 13. 1990 4-year college salaries by selected academic rank on 9–10 month salary base, PhDs.

	QUARTILE SALARIES (in thousands of dollars)			Mean Salary	Standard Deviation	Median Age	Total Number Known
	25th	Median	75th				
Professor	40.0	46.6	53.0	47.1	9.2	53	88
Associate Professor	35.0	39.0	42.0	39.8	6.4	44	36
Assistant Professor	28.0	31.7	35.0	31.8	4.6	37	45

a professorial rank in a university are full professors. This top heavy structure could prove problematic as we enter the 1990s and many current physics faculty members reach retirement age.

• At each academic rank, professors on 11–12 month contracts earn more than those on 9–10 month contracts. This is the result of three factors: 1) faculty on 11–12 month contracts report salaries which cover the entire year, including the summer months; 2) at each professorial rank, those on 11–12 month contracts are older; and 3) professors who are primarily involved in administration, and therefore command higher salaries, are more likely to be on 11–12 month contracts. After these three factors are controlled for, the salaries paid to professors on both bases appear to be remarkably similar.

• According to data published by the AAUP, physics professoriate salaries are in line with salaries paid to faculty in the other physical sciences and mathematics. Top academic salaries go to engineering, business and computer science faculty. In fact, among new assistant professors in these select disciplines, salaries exceed the overall average by one-third as a result of stiff competition with the private sector.

• Less than 5% all of society members with doctorates work in four-year colleges. At age 49, they are older as a group than society members employed in every other maior sector. Despite being older, associate and assistant professors employed in four-year colleges earn considerably less than their university counterparts. Similarly, although full professors in four-year colleges are the same age as full professors in universities, they earn 28% less per year.

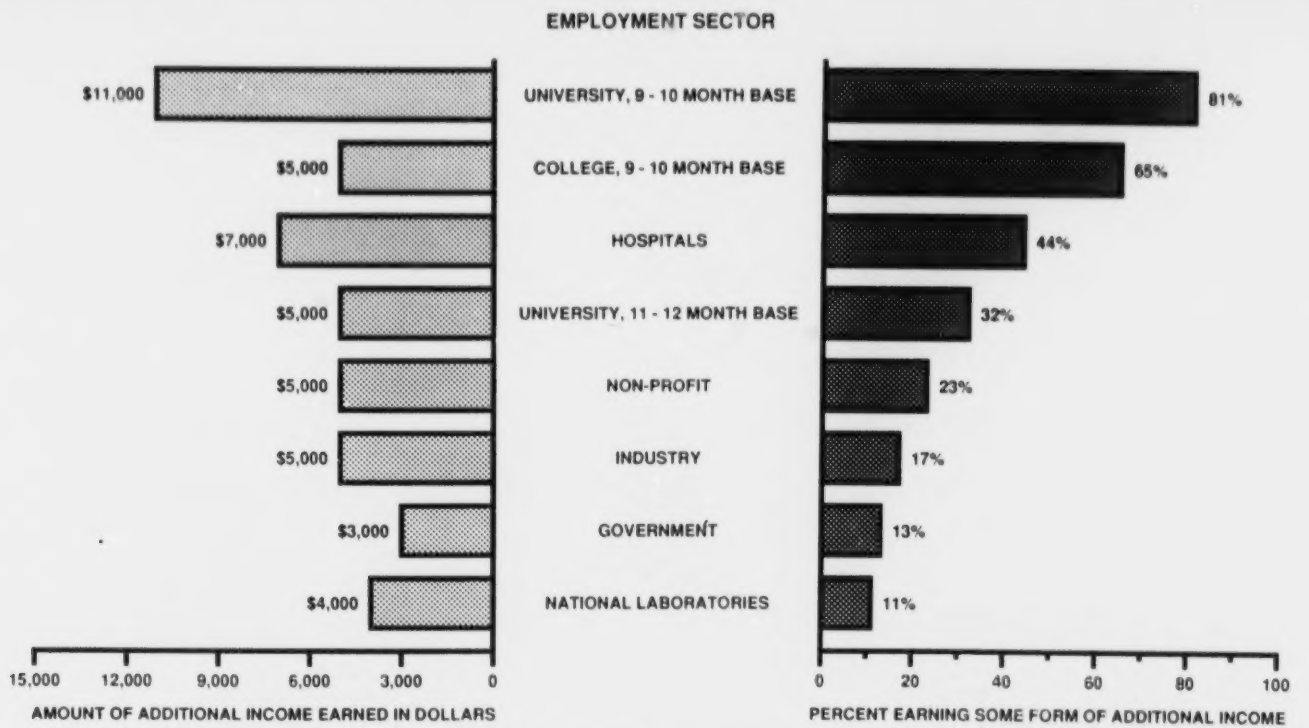

Figure 10. Median additional income, and percent earning some form of additional income, by type of employer, 1990.

Additional Sources of Professional Income

• Over one-third of all full-time employed PhDs supplement their principal salaries with earnings from additional sources. The most frequently cited sources include: consulting, summer research, teaching, and, to a lesser extent, patents, royalties, and honoraria. While the amount of additional income earned varies from a few hundred dollars to tens of thousands, the overall median for PhDs is $8,000. Members employed in academe and hospitals are the most likely to earn additional professional income.

• University-employed PhDs earn, on average, 27% less at each level of experience than PhDs in industry. Additional income from summer teaching, research, and consulting reduces this gap somewhat, but does not eliminate it. After including additional earnings, university salaries still fall short of those received in industry by 18%.

• Among nonacademic members, PhDs employed in hospitals are the most likely to supplement their principal salaries. This auxiliary income comes almost exclusively from consulting; approximately 85% of PhDs employed in hospitals who earn some form of additional income consult. At an average of $7,000 per year, this additional income represents 10% of their total take-home pay and brings the total professional income of hospital-employed PhDs up to par with the total income of the industrially-employed.

• PhDs employed in the national laboratories and government are least likely to earn additional income. Roughly 10% of these members supplement their principal salary with outside earnings, averaging $3,000-4,000 per year.

Table 14. 1990 salaries by selected employment sector, Masters.

	Median Salary	Mean Salary	Standard Deviation	Median Age	Total Number Known
	(in thousands of dollars)				
Junior College	38.3	38.8	8.5	50	56
Secondary School Teachers	36.0	37.1	10.2	45	275
Industry/Self-Employed	52.0	58.0	48.4	39	458
Government	46.4	47.3	12.4	43	197
FFR&DC	54.4	57.4	23.7	39	59
Nonprofit	42.3	46.2	15.4	40	26
Hospital	55.0	56.3	16.6	39	73

SALARIES FOR MASTERS AND BACHELORS

• Although the vast majority of society members are PhDs, a small proportion, 25%, hold only master's or bachelor's degrees. These individuals often have very specific society interests and are not typical of all lower degree holders in the physical sciences. Over two-thirds of this group are employed primarily in industry, secondary schools, and government. The remaining one-third are full-time graduate students pursuing advanced training.

• At the master's level, approximately 37% of employed society members work in industry, 22% in secondary schools, and 16% in government. At entry level, salaries of the best-paid high school teachers overlap the lowest industrial salaries. However, typical salaries received in industry are significantly higher than those received in secondary schools. This huge salary differential exists despite the fact that high school teachers, at age 45, are on average six years older than their industrially-employed counterparts.

• Master's degree holders comprise 75% of all society members employed in secondary schools. These individuals are several years older than their nonacademic counterparts at all but the highest level of experience. In contrast, at the bachelor's level, secondary school employees tend to be similar in age or younger than those working in other sectors. This shift in relative ages suggests that many high school teachers who pursue master's degrees do so after they have been in the workforce for a period of time.

• The range of salaries for masters in both government and secondary schools is fairly narrow. At low levels of experience, industrial salaries fall into an equally narrow band. However, typical salaries of industrially-employed individuals several years from their master's degrees span a range of as much as $25,000.

• A small number of master's degree holders are employed in national laboratories and hospitals. The highest median salaries among masters, over $54,000 annually, are reported by these individuals. Furthermore, the difference between median salaries at the master's and doctoral levels in these sectors is proportionately less than in other major employment sectors.

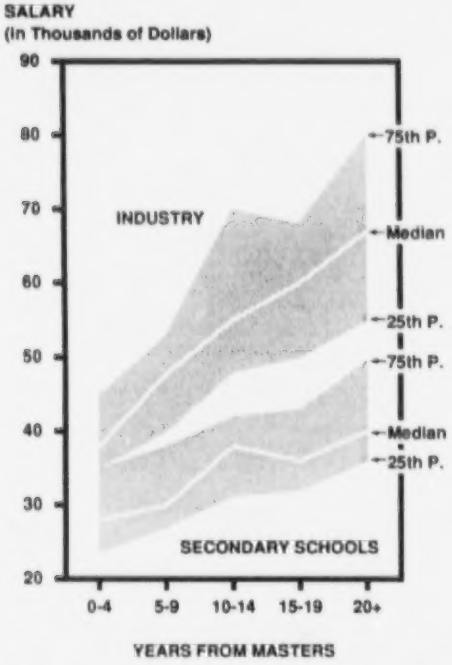

Figure 11. Salary structure in industry and secondary schools by years from master's degree, 1990.

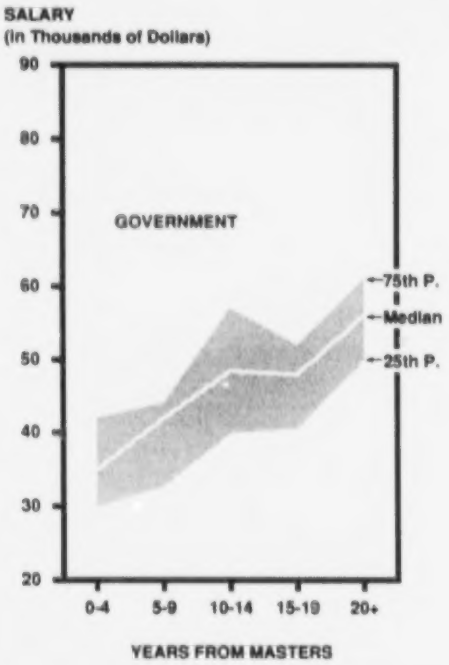

Figure 12. Salary structure in government by years from master's degree, 1990.

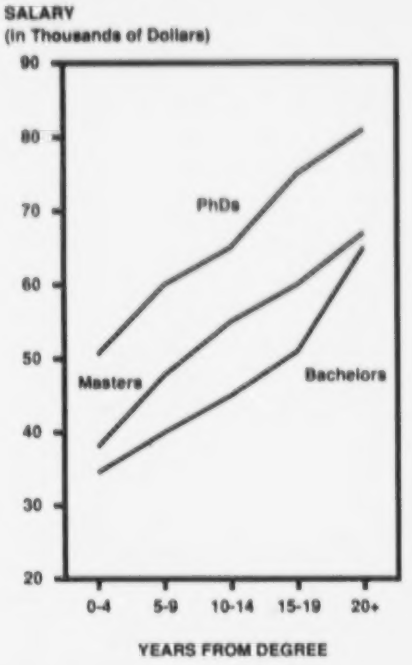

Figure 13. Median salaries in industry by degree level and years from degree, 1990.

• Over one-fourth of masters receive income from bonuses, honoraria, overtime pay, and secondary jobs, in addition to their basic annual salaries. While the additional professional incomes of some individuals are quite high, the median additional income for this group as a whole is only $4,000. Members employed in academe and hospitals are more likely to have a secondary source of income than their counterparts in government, national labs, and industry.

• Nearly 40% of master's-level high school teachers receive professional income in addition to their principal salaries. However, even with this supplemental income of, on average, $2,400 annually, secondary school salaries still fall substantially below those received by masters in industry. Summer teaching is cited by 45% as a source of additional income. Consulting and other activities are also sources.

Table 15. 1990 salaries by selected employment sector and years from degree, Masters.

	Years from Degree	QUARTILE SALARIES 25th	Median (in thousands of dollars)	75th	Mean Salary	Standard Deviation	Median Age	Total Number Known
Secondary School (teachers only)	0–4	23.5	28.0	35.0	29.6	8.2	38	32
	5–9	27.0	30.0	38.0	32.1	8.3	39	34
	10–14	31.2	38.0	42.0	37.5	9.1	42	41
	15–19	32.0	36.0	43.0	37.6	10.1	45	92
	20 +	36.0	40.0	49.6	41.6	9.8	52	76
Industry	0–4	35.0	38.0	45.0	41.0	12.5	30	106
	5–9	40.0	47.8	53.0	49.1	13.2	34	91
	10–14	48.0	55.0	70.0	59.0	18.1	38	85
	15–19	50.0	60.0	68.1	61.1	16.8	42	53
	20 +	55.0	67.0	80.0	77.4	87.5	56	120
Government	0–4	30.0	35.0	42.0	36.8	8.9	33	46
	5–9	32.8	42.0	44.1	41.9	9.9	34	29
	10–14	40.0	48.5	57.1	49.8	11.5	39	38
	15–19	40.6	48.0	52.0	48.3	8.3	44	28
	20 +	50.0	56.0	61.0	56.7	10.4	55	55

Table 16. 1990 industrial salaries by years from degree, Bachelors.

	Median Salary	Mean Salary (in thousands of dollars)	Standard Deviation	Median Age	Total Number Known
0–4	34.5	35.9	10.1	26	37
5–9	40.0	41.7	11.2	30	59
10–14	45.0	45.9	11.0	35	37
15–19	51.0	53.2	20.8	40	26
20 +	65.0	71.9	27.8	53	83

• Approximately 60% of society members holding only bachelor's degrees work in the industrial sector, where the median salary is $47,000. Secondary schools and government employ an additional 17% and 14%, respectively. As at the master's level, bachelors employed in secondary schools receive salaries which are substantially below those received in industry and government. In fact, with a median salary of $26,000 per year, these individuals report the lowest wages of all society members.

• Industry is the only sector with enough lower degree holders for comparison of median salaries across degree levels. As a general rule, individuals with more advanced degrees receive higher salaries. At entry level, bachelors in industry earn a median salary of $34,500, masters earn $38,000, and PhDs earn $50,600. At higher levels of experience, the disparity between PhDs' and bachelors' median salaries ranges from $16,000 to $24,000.

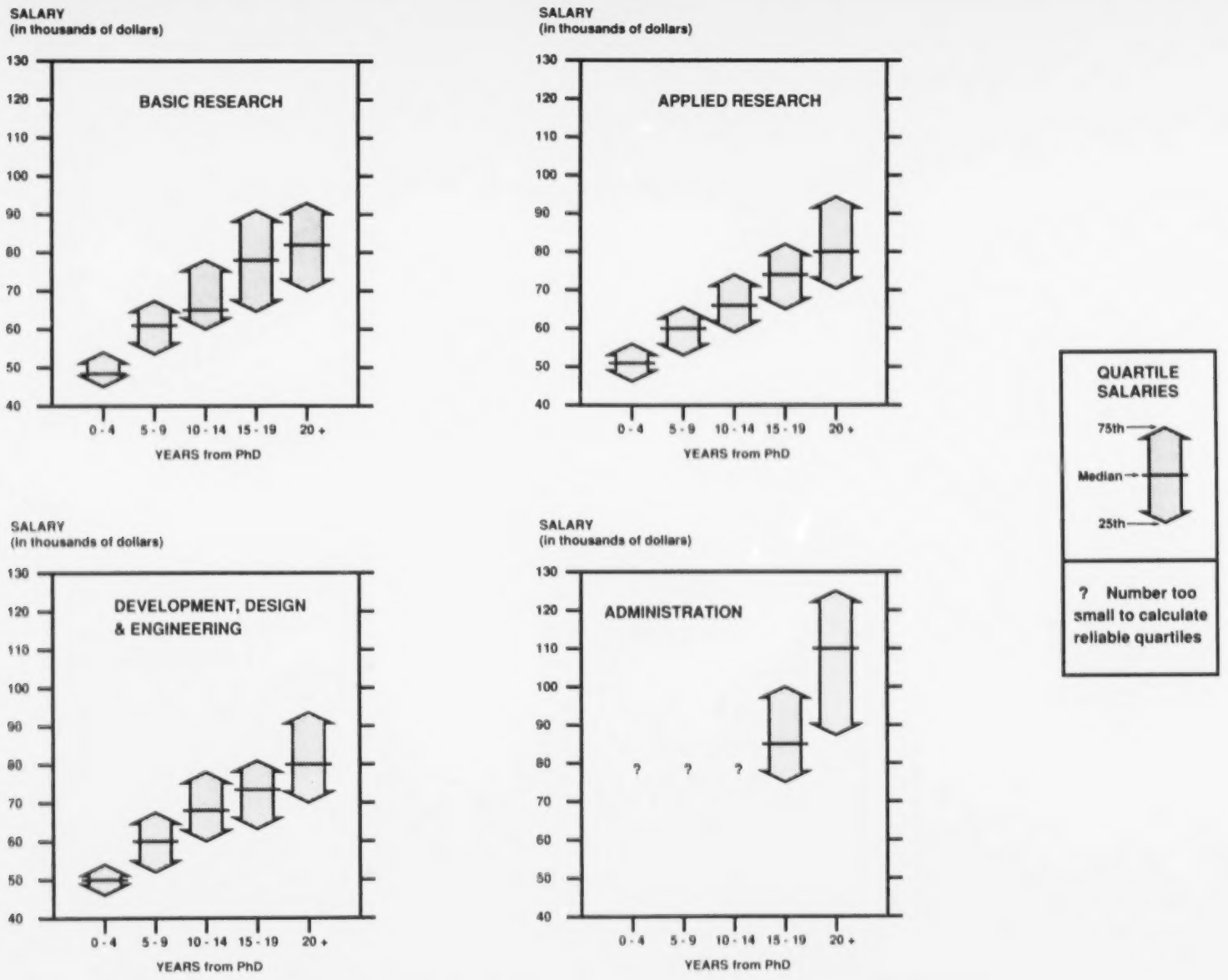

Figure 14. Industrial salaries by principal work activity and years from PhD, 1990.

Table 17. 1990 industrial salaries by primary work activity and years from degree, PhDs.

Years from Degree	QUARTILE SALARIES 25th	Median (in thousands of dollars)	75th	Mean Salary	Standard Deviation	Median Age	Total Number Known
Basic Research							
0–4	45.0	48.4	54.0	49.0	9.0	31	35
5–9	53.5	61.0	67.4	60.7	10.2	35	46
10–14	60.0	65.0	78.0	67.9	12.3	40	27
15–19	64.6	78.0	91.0	78.3	20.0	45	23
20 +	70.0	82.0	93.0	83.9	20.2	56	41
Applied Research							
0–4	46.2	51.0	56.0	52.9	9.6	32	87
5–9	53.0	60.0	65.5	59.7	9.3	36	104
10–14	58.0	66.0	74.0	67.2	13.7	40	97
15–19	65.0	74.0	82.0	75.5	15.2	45	103
20 +	70.3	80.0	94.4	83.2	17.8	54	117
Development, Design, and Engineering							
0–4	46.0	50.0	54.0	50.9	7.8	32	42
5–9	52.0	60.0	67.5	61.3	18.6	37	82
10–14	60.0	68.0	78.0	68.8	13.2	42	73
15–19	63.2	73.4	81.0	74.4	18.3	47	61
20 +	70.0	80.0	93.6	81.1	23.0	53	91
Administration							
0–4	*	*	*	*	*	*	4
5–9	*	*	*	*	*	*	4
10–14	*	*	*	*	*	*	16
15–19	75.0	85.0	100.0	91.1	22.1	46	22
20 +	87.3	110.0	125.0	121.6	70.3	53	61

**Number of respondents was too small to calculate reliable quartiles.*

SALARIES AND PRIMARY WORK ACTIVITY

- Industry employs nearly 30% of all society members holding doctorates. The widest range of both salaries and work activities can be found in this sector.

- Starting salaries in industry do not vary significantly from one primary work activity to the next. Salaries paid to industrial PhDs with less than five years of experience cluster narrowly around $50,000 a year. More PhDs holding entry-level jobs in industry are engaged in applied research than in any other primary work activity.

- At higher levels of experience, primary work activity also appears to have little effect on salary. Individuals engaged in research, development, design, or engineering have remarkably similar rates of compensation throughout their careers. Administration is the one exception to this rule.

- Administrators earn 13–38% more, on average, than their peers outside of administration. Society members with doctorates typically move into administration later in their careers; nearly 80% of all administrators have fifteen or more years of experience.

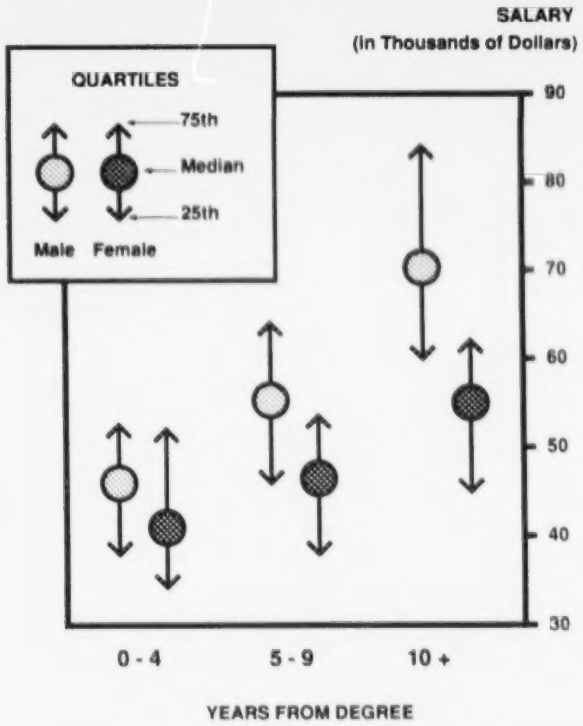

Figure 15. Median salaries in industry by sex and years from degree, 1990.

Table 18. 1990 industrial salaries by sex and years from degree.

	QUARTILE SALARIES (in thousands of dollars) 25th	Median	75th	Median Age	Total Number Known
YEARS FROM DEGREE					
0–4					
Male	38.0	46.0	52.5	31	286
Female	34.3	41.0	52.0	31	49
5–9					
Male	46.0	55.3	64.0	36	379
Female	38.0	46.5	53.5	34	40
10 +					
Male	60.0	70.3	84.0	47	1253
Female	45.0	55.0	62.0	41	55

SALARIES FOR MALES AND FEMALES

• Among society members, only 7% of PhDs, 14% of masters, and 17% of bachelors are women. These figures have grown somewhat since the early 1980s, when women comprised fewer than 5% of PhDs and 10% of masters and bachelors. The American Geophysical Union, which joined the AIP in 1987 and has a relatively high proportion of female members, is responsible for part, but not all, of this increase.

• At all degree levels, men typically earn higher salaries than women. Part of this disparity can be attributed to the fact that men at each degree level are, on average, several years older than women and have therefore been in the workforce longer. Commensurate with their greater experience, men receive higher salaries. However, age and experience do not account entirely for differences in salary. Employment patterns, career paths, and discrimination also influence the extent to which salaries diverge.

• Three-fourths of male society members are PhDs, as compared to 60% of female society members. This difference is responsible, in part, for variations in employment sector by gender. Men are more likely to work in universities, which typically employ PhDs, while a large proportion of women work in secondary schools, which are among the principal employers of lower degree holders. Differences in employer type, however, cannot be entirely attributed to degree level; after controlling for degree,

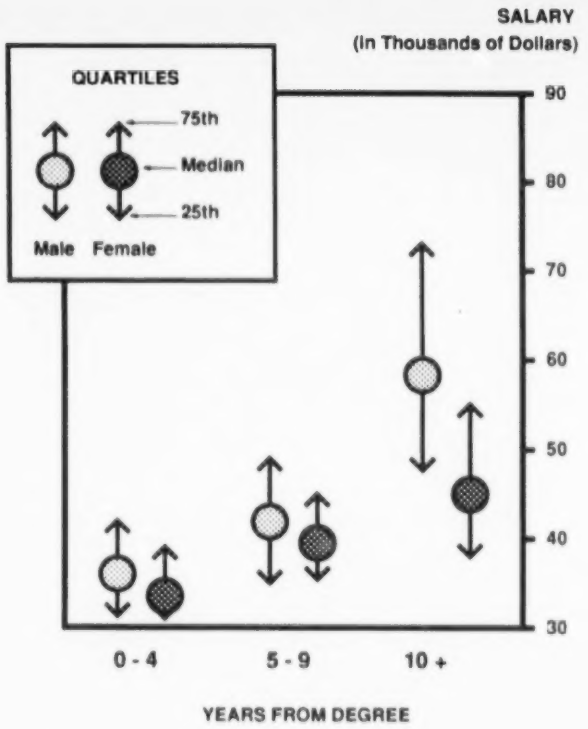

Figure 16. Median salaries in universities by sex and years from degree, 1990.

Table 19. 1990 university salaries by sex and years from degree.[a]

	QUARTILE SALARIES (in thousands of dollars)			Median Age	Total Number Known
	25th	Median	75th		
YEARS FROM DEGREE					
0–4					
Male	31.3	36.0	42.0	33	179
Female	31.0	33.5	39.0	31	30
5–9					
Male	35.0	41.9	49.0	36	271
Female	35.4	39.5	45.0	36	40
10 +					
Male	47.7	58.3	73.0	51	1401
Female	38.0	45.0	55.0	46	77

[a] *Postdoctorates excluded.*

women are still more likely to be high school teachers, whereas men are more concentrated in industrial jobs.

• In industry, the disparity between men's and women's salaries increases with experience. At the lowest level of experience, men's salaries are $5,000 over those of women. This gap widens to $15,300 among individuals ten or more years from degree. Salary differences at entry level can be attributed primarily to the fact that a larger proportion of women hold lower degrees. At higher levels of experience, though, a significant gender gap in wages exists even after variations in age and degree are taken into account.

• As in industry, the largest disparity between men's and women's salaries in academe occurs at the highest level of experience, although differences can be seen at all levels. With a median salary of $58,300, men ten or more years from degree earn salaries 30% above those of women. Some of this difference is due to the fact that men in this group are five years older than women. In addition, a substantially higher proportion of men are full professors, whereas women tend to be concentrated in the lower professorial ranks or research staffs. However, gender differences in neither age nor academic rank are substantial enough to completely account for the gap between men's and women's salaries in the academic sector.

APPENDIX A: GEOGRAPHIC DIVISIONS

NEW ENGLAND
Connecticut
Maine
Massachusetts
New Hampshire
Rhode Island
Vermont

MIDDLE ATLANTIC
New Jersey
New York
Pennsylvania

SOUTH ATLANTIC
Delaware
District of Columbia
Florida
Georgia
Maryland
North Carolina
South Carolina
Virginia
West Virginia
Puerto Rico

EAST NORTH CENTRAL
Illinois
Indiana
Michigan
Ohio
Wisconsin

EAST SOUTH CENTRAL
Alabama
Kentucky
Mississippi
Tennessee

WEST NORTH CENTRAL
Iowa
Kansas
Minnesota
Missouri
Nebraska
North Dakota
South Dakota

WEST SOUTH CENTRAL
Arkansas
Louisiana
Oklahoma
Texas

MOUNTAIN
Arizona
Colorado
Idaho
Montana
Nevada
New Mexico
Utah
Wyoming

PACIFIC
Alaska
California
Hawaii
Oregon
Washington

APPENDIX B: TECHNICAL NOTES

Median

The median, a measure that is frequently used in this report, is that point in a distribution above and below which 50% of the values fall. Since it is less influenced by extreme values than the arithmetic mean, it is the preferred descriptive measure of central tendency in typically skewed salary and age distributions. In most of the tables, both median and mean salaries are presented; observed differences reflect the skewness in the distributions.

Quantile Calculations

The P-STAT statistical package was used to compute the medians and other quantiles presented in the salary tables and figures. Percentiles were not interpolated when the requested quantiles fell a certain fraction into a group of equal values or when fractional weights were used.

Quantiles and Interquantile Ranges

Ninety percent of the values in a distribution fall below the ninth decile, seventy-five percent below the third quartile, twenty-five percent below the first quartile and ten percent below the first decile. The interdecile and interquartile ranges, which indicate differences between deciles and between quartiles, are measures of variation within distributions and are used in several of this report's figures.

Employment Base

Salary data are presented for current society members who are employed full-time in the U.S. Students are not included.

Sampling Error

The salary figures in this report may be affected by different sources of error. Society members who did not respond may have had somewhat different salaries than those who did respond, thus introducing response bias. Although earlier surveys in this series estimated that the effects of response bias were minor, the possible effect remains. A fuller explanation of response bias is presented in the methodological appendices of the membership profiles. Since the data in this report are based upon a small random sample, they are also subject to sampling error. The variability introduced by the sampling procedure depends both on the size of the subgroup being examined, and the variation of values in the population. The formulas below present conservative estimates of the standard error based on simple random sampling. When standard errors were calculated, taking into account the minor stratification by society used in the sampling, slightly lower estimates resulted. Confidence intervals for proportions, means, and medians can be determined as follows:

Medians:

M_1, *that point below which* p_1^{th} values fall,
M_2, *that point below which* p_2^{th} values fall,

where

$$p_1 = p + Z\left(\frac{p(1-p)}{n}\right)^{1/2}, \quad p_2 = p - Z\left(\frac{p(1-p)}{n}\right)^{1/2},$$

and

$P = 0.5$,
n = sample size,
z = coefficient of confidence, 1.96 at the 95% confidence level.

Means:

$\bar{x} \pm Zs/(n)^{1/2}$, *where*
$\bar{x}$ = the arithmetic mean,
s = standard deviation,
n = sample size, and
Z = coefficient of confidence 1.96 at the 95% confidence level.

Proportions:

$$p \pm Z\left(\frac{p(1-p)}{n}\right)^{1/2}$$

p = sample proportion observed,
n = sample size, and
Z = coefficient of confidence, 1.96 at the 95% confidence level.

Cost-of-Living Index

The cost-of-living index used in this report was developed by the American Chamber of Commerce Researchers' Association (ACCRA). Its purpose is to provide "a useful and reasonably accurate measurement of inter-city cost of living differences." The index measures "relative price levels for consumer goods and services in participating cities, as compared with the national average for all participating cities (metropolitan and nonmetropolitan)." Differences of more than three index whole numbers in the all-items index can be considered to represent actual inter-city differences in the cost of consumer goods and services; but the percentage difference in such cases should be considered a reasonable indication, rather than a precise measure, of the extent of the differences.